Premature Presbyopia and its Risk Factors - A Hospital based Study

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ABSTRACT

Introduction: Presbyopia, a physiological insufficiency of accommodation, impairs the ability to perform near task. Considered as a disease of the forties, it reduces functional efficiency of the individual as well as the society since it affects the majority of working population. This study was an effort to evaluate the risk factors that can lead to its earlier onset. Purpose of the study was to evaluate the frequency of risk factors associated with premature presbyopia in a hospital-based study in Sundergarh district, Odisha.

Material and Methods: It was a hospital-based study carried out at Hi-Tech Medical College and Hospital, Rourkela from October 2016 to October 2018. Patients aged 30 years or more who presented with difficulties in near work were included in the study. Premature presbyopic was defined as presbyopic person aged less than 40 years. Premature presbyopics were further subjected to a questionnaire and detailed examination after taking informed consent.

Results: The mean age of presentation in premature presbyopics was 36.2 years and the average correction required was 1.22 D. Among the total number of persons presenting with presbyopia about one-eighth (12.03%) presented before 40 years. Female sex, occupation requiring near work, exposure to sunlight for longer duration and hypermetropia were most common risk factors over all. Among males smoking, alcohol, exposure to higher temperature (factory workers) were significant risk factors. Multiparity, anemia and premature menopause presented as important risk factors in females. Smart phone usage was found to be an important risk factor in urban population.

Conclusion: Early presentation of presbyopia reduces the functional efficiency of the individual. Evaluation of risk factors will help to determine the population at risk of premature presbyopia and their prompt management can be done with near correction.

Keywords: Premature Presbyopia, Smoking, Smart Phone, Multiparity, Menopause

INTRODUCTION

Presbyopia - a natural age-related condition, is the result of a gradual decrease in accommodative amplitude, from about 15D in early childhood to 1 D before the age of 60 years.[1] Blurred vision and the inability to see fine details at the customary near working distance are the hallmarks of presbyopia. Other common symptoms are ocular discomfort, headaches, asthenopia, fatigue from near work, increased working distance and need for brighter light for reading.[2] The onset of presbyopia is approximately between 40 to 45 years of age however, there is some inter-individual and geographic variation.[3] Since there is no universally accepted definition or no standardised technique to measure it, the prevalence of presbyopia will therefore depend on how it is defined in the study.[3]

In premature presbyopia, accommodative ability becomes insufficient for patient's usual near vision tasks at an earlier age than expected, due to environmental, nutritional, disease-related, or drug induced causes.[1,2] Individuals whose occupation require extensive use of near vision often notice symptoms earlier than similarly aged individuals. Changes in work place environment, such as computer technology may create new type of visual demands.[2] Conditions such as diabetes mellitus, vascular disease, trauma, or the use of certain medications (e.g., antianxiety, antidepressant, antipsychotic agents) may contribute to premature presbyopia.[2] Alcohol intake and smoking is also reported to be associated with early presbyopia.[7,8,9]

There is earlier onset of presbyopia in females due to short stature, or menopause.[10] Uncorrected hypermetropia where there is additional accommodative demand leads to early presbyopia. Environmental factors including high average ambient temperature, exposure to much ultraviolet radiation, chronic deficiency of essential amino acids, and exposure to toxic factors, particularly hair dye play significant role in precipitating the early onset of presbyopia.[11,12]

The study aimed to evaluate the frequency of risk factors associated with premature presbyopia in a hospital-based study in Sundergarh district, Odisha.

MATERIAL AND METHODS

It was a hospital based prospective study carried out among the patients presenting to the outpatient department of Hi-Tech Medical College and Hospital, Rourkela, Dist. Sundergarh, Odisha from October 2016 to October 2018.

Patients aged 30 years or more who presented with difficulties in near work were included in the study. A presbyopic was defined as one who required an addition of at least +1.00D in either eye in addition to their best corrected distance correction to improve his near vision to N6. Premature presbyopic was defined as presbyopic person aged less than 40 years.

Premature presbyopics were further subjected to a questionnaire and detailed examination after taking informed

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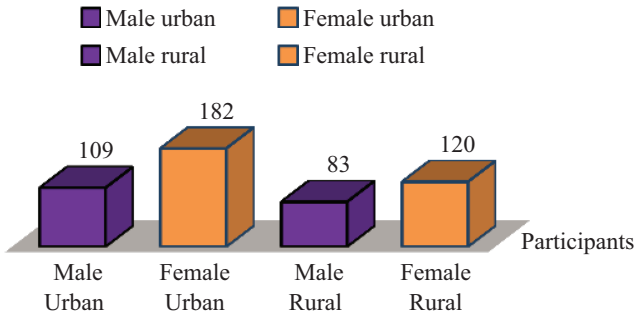
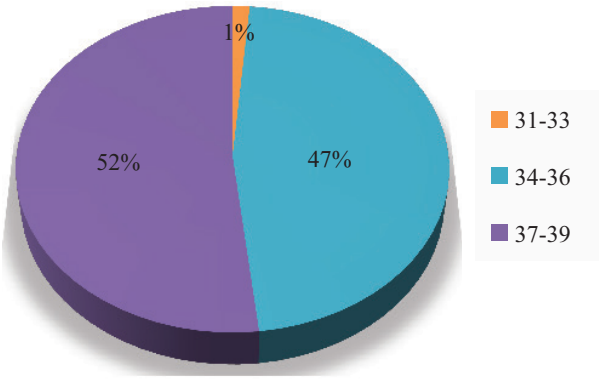
Risk factors	Males (%)		Females (%)		Total (%)	
	Number	%	Number	%	Number	%
Near work	84	43.7	67	22.2	151	30.5
Smart phone users	94	48.9	70	23.2	183	37
Sun exposure (>6 hrs/day)	57	29.7	42	13.9	99	20
Smoking	90	46.9	NIL	NIL	NA	NA
High temperature exposure	33	17.2	NIL	NIL	NA	NA
Alcohol	69	35.9	2	0.6	71	14.4
Smoking + Alcohol	46	23.9	NIL	NIL	NA	NA
Multiparity	NA	NA	85	28.2	NA	NA
Menopause	NA	NA	37	12.3	NA	NA
Anemia	4	2.08	63	20.8	67	13.5
Hypermetropia	36	18.7	25	8.3	61	12.3
Gastritis	21	10.9	38	12.6	59	11.9
Short stature	15	7.8	24	7.9	39	7.9
Diabetes	11	5.7	7	2.3	18	3.6

Table-1:



Graph-1: Demographic details



Graph-2: Age- distribution

consent. Detailed ocular examination included recording of distance and near visual acuity, slit lamp examination, applanation tonometry, and posterior segment examination. Pseudophakics and patients having ocular pathologies like cataract, uveitis, corneal opacity, vitritis, ARMD, retinal detachment were excluded from the study.

Detailed history of premature presbyopic patients was taken with the help of a questionnaire which included questions regarding their occupation, life style, personal history, tobacco or alcohol use, menstrual history and parity in females, systemic diseases and previous use of spectacles. Systemic evaluation included measurement of height and weight, calculation of BMI, laboratory investigations like Hb%, and fasting blood sugar. For assessment following guidelines were set

1. Smoking - Persons smoking at least 5 cigarettes a day or greater than 1 year
2. Alcohol - At least thrice a week
3. Anemia - Haemoglobin <10 g/dl[17]
4. Multiparity – parity ≥ 3
5. Sun exposure – Exposed to sun for a minimum of 6 hours /day
6. Smart phone users – Using smart phone for at least one hour at a stretch or for at least 2 hours throughout the day and over 6 months (except phone calls)
7. Short stature – Height <150cm in females and <162 cm in males

Objective and subjective refraction was done and patient was corrected for near vision after correction for distance. Data was collected was analysed.

RESULTS

Our study included a total of 4106 presbyopics out of which 494 (12.03%) patients presented with premature presbyopia. Among the early presbyopics 302(61.13%) were females and 192(38.87%) males. Rural patients comprised of 203 (41.09%) while 291(58.90%) lived in urban settings (Graph 1) The mean age of presentation in premature presbyopics was 36.2 ± 2.1 years (Graph 2). The lowest age of presentation was 32 years. The average correction required was 1.19 ± 0.046 in males and 1.30 ± 0.08 in females.

Smart phone usage (37) followed by near work was the most common risk factor (30.6%) overall followed by sun exposure in one-fifth of patients. Refractive error was present in 20.04% (99) most common being hypermetropia (12.34%) followed by astigmatism (5.87%) (Table 1).

Among the 302 female patients the most frequent risk factors included multiparity 28.14% (85), anemia 20.86% (63) premature menopause 12.25% (37). In the male patients smoking 46.87% (90), alcohol 35.93% (69), both alcohol and smoking 23.95% (46) were most frequent (Table 1).

Among the urban population 56.3% (164) were smart phone users while rural users were only 9.35% (19). Prolonged sun exposure was most common risk factor in rural population

(36.4%)
Other risk factors included gastritis (11.9%), short stature (7.9%) and diabetes (3.6%). In 11 patients (2.2%) no specific risk factor could be ascertained.

DISCUSSION

In our study 41.09% of premature presbyopics were from rural areas while 58.9% had urban residence. Our study was conducted in Rourkela, which is a city surrounded by tribal villages where farming is the main occupation. On the other hand, residents of Rourkela city are mainly industrial workers. The study was based on patients presenting with the complains of blurring of near vision with a majority complaining of their difficulty using cell phones or while performing their daily activity. The study indicated a higher prevalence of premature presbyopia in females (61.13%). This corelates with the studies done by Mukuria M et al[4] and Duarte et al[5] but against the study done by Bernice et al[6] in Nigeria which showed higher prevalence in males. The mean age of person with presbyopia before the age of 40 was 36.2 ± 2.1 which corelates to the studies of Nirmalan P et al[7] in Andhra Pradesh (36.6 ± 1.9).
Interesting observation was the presence of early presbyopia in multiparous females (28.2%) and those with premature menopause (37,12.3%). To the best of our knowledge no other study has explored the relation between premature presbyopia, multiparity and premature menopause. Since menopause is associated with physical, physiological, physiologic changes, hormonal changes may play role in presbyopia (Nirmalan et al[7], Borish[13], Emerole et al[15]). Early presbyopia in multiparous females may be associated with poor nutrition or associated anemia. Anemia is also present in nearly more than one-fifth of females irrespective of their parity emphasizing the role of poor nutritional status in presbyopia. In the study done in Nigeria by Emerole et al[15] the role of poor nutrition in presbyopia has been mentioned.
Among male patients smoking, near work, alcohol abuse was the main associated factor. Occupations that require near vision like tailor, jewellery or watch industry, mobile technicians and electricians were more prone to premature presbyopia. More than half of urban presbyopics were smart phone users. Smart phone usage increases visual demand for near work and hence may be associated with early presbyopia. Study in Nigeria by Bernice et al[6] also emphasizes increased visual task as the main contributing factor for onset of presbyopia before 35 years.
The early onset of presbyopia in farmers and drivers who have daily substantial sunlight exposure (< 8hours/ day) indicates a role of ultraviolet radiation. About one-eighth (12.34%) of the presbyopics were factory workers who are predisposed to higher than average temperatures and it may be a risk factor for premature presbyopia in them. Most of these workers are employed in the steel industries spread around Rourkela and are exposed to high temperatures while working on the 'blast-furnaces' or 'coke-ovens'. The importance of geographic factors in the onset of presbyopia has been emphasized in the study by Mirinda et al[1] where it has been stated that ultraviolet radiation and high average environmental temperatures can accelerate the aging process in lens leading to presbyopia.
A significant (47%) number of male patients were smokers while 23% consumed alcohol as well. Hafez et al[8] in Iran showed earlier onset of presbyopia in smokers while in the study done by Fasih et al[9] 35% of early presbyopics were tobacco chewers. Alcohol consumption was present in more than one-third of males which corroborates the association of alcohol with presbyopia (Nirmalan et al[7]) Hypermetropia was most common refractive error found to be associated.

CONCLUSION

Our study was a hospital-based study where we have recorded the patients who have approached us with 'functional premature presbyopia' i.e., with symptomatic near vision difficulty. If the study is conducted in the community the magnitude of premature presbyopia will be much higher.
Presbyopia reduces the functional efficiency of the individuals. It affects all section of society – literates and illiterates, since near vision is required not only for office work but day to day activity as well. Increased visual demands associated with occupation or smart phone usage may lead to premature presbyopia. Proper nutrition, modifying work environment (protective goggles or ambient light), avoidance of smoking and alcohol may be a small step in retarding the early onset of presbyopia. Evaluation of risk factors will help to determine the population at risk of premature presbyopia and their prompt management can be done with near correction. Glasses are cost-effective intervention to improve the quality of life in premature prebyopics.

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